

REMARKS

Applicant respectfully requests reconsideration of this application in view of the following remarks. For the Examiner's convenience and reference, Applicant's remarks are presented in substantially the same order in which the corresponding issues were raised in the Office Action.

Status of the Claims

Claims 1-20 are pending. Claims 1 and 10 are currently amended to more clearly define pre-existing claim limitations. No claims are canceled. Claims 19 and 20 are added. No new matter has been added.

Summary of the Office Action

Claims 1-4 and 9-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,484,222 to Olson et al. (hereinafter "Olson") in view of U.S. Patent Application No. 2005/0044442 to Barr et al. (hereinafter "Barr").

Claims 5-8 and 15-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Olson in view of Barr and further in view of common knowledge in the data processing art.

Response to Rejections under 35 U.S.C. § 103(a)

The Office Action rejected claims 1-4 and 9-14 under 35 U.S.C. § 103(a) as being unpatentable Olson in view of Barr. Applicant respectfully requests withdrawal of these rejections because the combination of cited references fails to teach or suggest all of the limitations of the claims.

CLAIMS 1-4 AND 9

Claim 1 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Olson in view of Barr. Applicant respectfully submits that claim 1 is patentable over the combination of cited references because the combination does not teach or suggest all of the limitations of the claim. Claim 1, as amended, recites:

An apparatus, comprising:
a variable speed bus;

a first unit coupled to the variable speed bus;
a second unit coupled to the variable speed bus; and
an arbitration and bus clock control unit to adjust the variable speed bus frequency depending on bandwidth requirements of the first and second units, the arbitration and bus clock control unit to monitor request rates from the first and second units in order to determine the bandwidth requirements. (Emphasis added).

In support of the rejection, the Office Action states, in part:

As per claim 1, the reference of Olson et al. teaches "a variable bus" in Fig. 2, element 85 and col. 1, lines 22-25; "first and second units coupled to the variable bus" in Fig. 2, elements 60, 70, 80 and 90 (consider any two devices connected to their respective slots) and **"an arbitration and bus clock unit to adjust the variable speed bus frequency depending on the bandwidth requirements of the first and second units, the arbitration and bus clock control unit to monitor request rates from the first and second units in order to determine bandwidth requirements"** in Fig. 2, elements 75, 77, 100 and col. 3, lines 37-62.

The reference of Olson et al. fails to expressly teach **"adjustment of variable speed bus frequency depending on the bandwidth requirements of the first and second units."** However, the above feature was well known to one of ordinary skill in the data processing art at the time the invention was made as evidenced by US Patent 2005/0044442 teaches the feature in Fig. 5, step 506. It would have been obvious to one of ordinary skill in the data processing art at the time the invention was made to modify the system of Olson et al. to implement the above features of US Patent Application Publication US 2005/0044442 to obtain the claimed invention because it is merely one of several straightforward possibilities already known in the data processing art from which one of ordinary skill in the data processing art at the time of the invention would select in accordance with circumstances without the exercise of inventive skill. The reference of Olson et al. already teaches the selection of speed of a variable speed bus based on the capabilities of the devices and the above feature of US Patent Application Publication US 2005/0044442 **would allow the system of Olson et al. to optimize performance of computer devices without exceeding a computer system's power or thermal budget** (US Patent Application Publication US 2005/0044442 teaches the motivation in col. 1, paragraph 0005). Office Action, December 27, 2005, pp. 3-4 (emphasis added).

Applicant respectfully disagrees with the Office Action's characterization of the prior art because the cited combination of prior art fails to teach or suggest all of the limitations of the claim. In particular, Olson and Barr, either alone or in combination, do not teach or suggest an arbitration and bus clock control unit to adjust the variable speed

bus frequency depending on bandwidth requirements of the first and second units, the arbitration and bus clock control unit to monitor request rates from the first and second units in order to determine the bandwidth requirements. Additionally, the Office Action fails to provide a motivation to combine the references.

Olson is directed to a system “for facilitating operation of a peripheral bus, such as a PCI bus, that operates at multiple clock speeds. The system includes an expansion slot controller that identifies the number of peripheral devices that have been installed in the expansion slots, and further determines whether these devices support high speed operation.” Olson, Abstract. In particular, the control logic 125 of expansion slot controller 100 “[s]imultaneously, the control logic 125 samples each of the 66 MHz enable lines connected to the expansion slots to determine if the devices present support high frequency operation ... If the device supports high speed operation, the sampled 66 MHz enable line will be passively asserted high. If the device cannot support high-speed operation, it will pull the 66 MHz enable line low. The control logic also samples the 66 MHz ENABLE line to determine if any other peripheral device has pulled that line low, indicating that the PCI bus must operate at low speed. The control logic 125 then makes a decision within a proscribed time period as to whether the PCI CLOCK signal should operate at the low or high speed. Determining if the multiple devices present in the expansion slots and making a decision as to whether the PCI CLOCK signal should operate at the low or high speed does not constitute “[monitoring] request rates from the first and second units in order to determine the bandwidth requirements,” as recited in claim 1. In addition, the Office Action correctly recognizes that Olson does not teach “adjustment of variable speed bus frequency depending on the bandwidth requirements of the first and second units.” Office Action, December 27, 2005, page 3. Thus, Olson does not teach or suggest an arbitration and bus clock control unit to adjust the variable speed bus frequency depending on bandwidth requirements of the first and second units, the arbitration and bus clock control unit to monitor request rates from the first and second units in order to determine bandwidth requirements.

Barr is directed to “[a] frequency manager [that] automatically selects a clock frequency for each device or bus, or for a plurality of devices or buses, in a system, based on various factors and objectives.” See Barr, Abstract. In general, Barr discloses that

“different devices can be operated at different clock speeds,” and correspondingly, a “clock speed budget can be allocated among the devices of the system,” so that “[i]ndividual devices can be operated at relatively higher or lower clock speeds.” See col. 2, para. 27. “The frequency manager can then control circuits that generate and provide *clock signals* having the selected frequency(ies) to these devices or buses.” See Barr, Abstract. Barr further discloses that “clock frequencies are calculated based on” information about the devices’ power consumption and/or heat dissipation characteristics, and “adjusted for the relative bandwidth requirements of the devices.” See col. 6, para. 55. More specifically, “the frequency manager 158 can select a high clock frequency, at which the devices 146-156 and/or the memory units 106-108 can operate without exceeding the system’s power or thermal budget” based on information about the devices’ power consumption and/or heat dissipation characteristics. See col. 5, para. 53, and col. 6, para. 55. “The frequency manager 158 can then adjust the clock frequencies of the PCI buses 110-118 and/or the memory bus 124, based on the [relative] bandwidth requirements of the respective devices 146-156,” which include “typical, minimum and maximum bandwidth requirements.” See col. 5, para. 53, and col. 4, para. 44. “For example, the frequency manager 158 can calculate an average bandwidth requirement of all the devices ... Then, for devices whose bandwidth requirements are above or below this average, the frequency manager 158 can increase or decrease the clock frequencies of their respective PCI buses 110-118 in proportion to the difference between the devices’ bandwidth requirements and the average bandwidth requirement. See col. 5, para. 53. Adjusting the relative bandwidth requirements, as described in Barr, does not constitute adjusting the variable speed bus frequency depending on bandwidth requirements of the first and second units, the arbitration and bus clock control unit to monitor request rates from the first and second units in order to determine the bandwidth requirements because the frequency manager 158 is merely calculating an average bandwidth requirement of all the devices, and determining whether the bandwidth requirement of a particular device is lower or higher than the average bandwidth in increasing/decreasing the clock frequencies of the respective PCI buses 110-118.

In contrast, claim 1 recites “an arbitration and bus clock control unit to adjust the variable speed bus frequency depending on bandwidth requirements of the first and

second units, the arbitration and bus clock control unit to monitor request rates from the first and second units in order to determine the bandwidth requirements.” For the reasons stated above, Olson and Barr, either alone or in combination, fail to teach or suggest all of the limitations of the claim. In particular, the cited references do not teach or suggest an arbitration and bus clock control unit to adjust the variable speed bus frequency depending on bandwidth requirements of the first and second units, the arbitration and bus clock control unit to monitor request rates from the first and second units in order to determine the bandwidth requirements.

Even if *arguendo* the combination of cited references were to disclose all of the limitations of the claim, the Office Action does not provide a proper motivation to combine the references. Here, the Office Action merely states an advantage of substituting the expansion slot controller 100 of Olson, with the frequency manager 158 of Barr, without explaining what specific understanding or technological principle within the knowledge of one of ordinary skill in the art would have suggested the combination.

Given that the cited references fail to teach or suggest all of the limitations of the claim, Applicant respectfully submits that claim 1 is patentable over the cited references. Moreover, the claim is patentable over the cited references because there is the Office Action fails to establish a motivation to combine the references. Accordingly, Applicant requests that the rejection of claim 1 under 35 U.S.C. § 103(a) be withdrawn.

Given that claims 3, 4, and 9 depend from independent claim 1, which is patentable over the cited references, Applicant respectfully submits that dependent claims 3, 4, and 9 are also patentable over the cited references. Accordingly, Applicant requests that the rejection of claims 3, 4 and 9 under 35 U.S.C. § 103(a) be withdrawn.

CLAIMS 10-14

Given that claim 10 includes the claim limitation of “an arbitration and bus clock control unit to adjust the variable speed bus frequency depending on bandwidth requirements of the first and second units, the arbitration and bus clock control unit to monitor request rates from the first and second units in order to determine the bandwidth requirements,” Applicant respectfully submits that claim 10 is patentable over the combination of cited references, for similar reasons as discussed above.

Given that claims 11-14 depend from independent claim 10, which is patentable over the cited references, Applicant respectfully submits that dependent claims 11-14 are also patentable over the cited references. Accordingly, Applicant requests that the rejection of claims 11-14 under 35 U.S.C. § 103(a) be withdrawn.

CONCLUSION


It is respectfully submitted that in view of the amendments and remarks set forth herein, the rejections have been overcome. If the Examiner believes a telephone interview would expedite the prosecution of this application, the Examiner is invited to contact Michael Mallie at (408) 720-8300.

If there are any additional charges, please charge them to Deposit Account No. 02-2666.

Respectfully submitted,

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